

and the author proceeds to deal with the carbides of iron, and finally with the well-defined carbides of niobium and tantalum, which have respectively the formulæ Nb_2C_3 and Ta_2C_3 .

A terse description is then given of the work of Troost and Hautefeuille on the heat of formation of carbides of iron and manganese, which led to the conclusion that the union of carbon and iron is attended with absorption of heat, while in the case of the union of carbon and manganese heat is evolved, the evidence leading to the belief that Mn_3C is a true compound possessing considerable stability. The action of heat on carbides is then dealt with, and a brief, but sufficient, reference is made to Forquignon's work on the action at a high temperature of hydrogen on cast-iron. The section concludes with a description of the modes of preparing carbides, and with a sketch of the formation and properties of the nitrocarbides, more especially those of niobium and titanium.

The sections of the work devoted to the consideration of tellurides, arsenides, and antimonides, are equally good. With regard to individual metals, in the portions of the work as yet published, only potassium, rubidium, cæsium, ammonium, thallium, sodium, lithium and the metals of the alkaline earths, barium, strontium, and calcium are dealt with, but sufficient evidence of the merits of the book has been given in this brief review to show that the rest of it will be gladly welcomed, for Prof. Ditte has earned his place among the great metallurgists of France.

We should be grateful for curves indicating the effect of definite elements on the physical constants of metals.

Baron Jonstorff's book is of an entirely different character, though it is not, in its way, less excellent or useful. He says that it issues from an ironworks, and is addressed to practical metallurgists. Its aim is, however, somewhat different from that of most treatises on analytical chemistry, the author's intention being not merely to guide the chemist in his analytical methods, but to enable a blast-furnace manager or an iron-master to realize what kind of services the laboratory can render, what questions relating to the routine of work the analyst can solve, and, above all, in what way the questions should be put.

The author deals with the more important special methods of analysis, and of assaying iron and steel, and he gives due attention to the examination of refractory materials—slags, fuel, and gaseous products—and his method is singularly clear and precise. An appendix gives tabular statements which will be useful in daily work.

The book, as a whole, shows incidentally the great difference between the works-laboratory of the present day and that of twenty years ago. There is still much room for improvement, no doubt, but the laboratory of an ironworks has, in many cases, ceased to be little better than a shed, erected, say, behind the boiler-house, with an analyst and a few boys as the scientific staff.

Those who have visited the author in his beautifully situated Styrian works, and have seen his manipulation, as the reviewer has, will appreciate the excellence of his labours, and will be glad that a good translation into French will make their results more generally known.

W. C. ROBERTS-AUSTEN.

BACTERIA AND THEIR PRODUCTS.

Bacteria and their Products. By Sims Woodhead, M.D. Published in the "Contemporary Science Series." (London: Walter Scott, 1891.)

SCARCELY a year passes in England, France, or in Germany, without the publication of one or more treatises on the fascinating subject of bacteriology. Many of the more recent of these works have been written for the general reader rather than for the student, and have shown a considerable want of accuracy and lucidity, a circumstance which can only be accounted for by the fact that accomplished bacteriologists have not been their authors.

We have now before us "Bacteria and their Products," a work which we might infer from a glance at the cover, and general arrangement, to be certainly intended for the general reader. This view is strengthened by the several object-lessons and homely similes scattered throughout the text, with the fitness of which we totally disagree; witness, for example, the extraordinary comparison of a nodule of *Actinomyces* with two daisy heads placed base to base, "the sterile flowers in the centre" then corresponding to the club-shaped rays. The comparison is bad, but the botany is worse. Then there is the not very abstruse mathematical problem on p. 24, and the guide-like description of the Pasteur Institute, all intended, we must conclude, for the general reader rather than for the student.

On the other hand, there is a very large collection of facts, much information about fermentation and chemistry (although the interesting and oft-quoted experiments of Raulin are omitted), numerous references, and a very plentiful supply of formulæ, the whole requiring, in order to understand and appreciate them, a reader equipped with a thorough knowledge of the sciences bearing on the subject.

Putting this question aside, however, we candidly confess that we do not admire the style or arrangement of the book. There is a conspicuous want of lucidity, and of that accuracy of observation which one would have expected of the author. For instance, "What are Bacteria?" is the question propounded in chapter ii.; but the answer to this key-stone question is left in much doubt, as the description of the protoplasm, cell membrane, mode of division and reproduction of the "specks," is exceedingly confused. We should not choose Gram's method to demonstrate the capsules of *Actinomyces*, nor, indeed, any other capsules; and we have reason to doubt, after the beautiful monograph on *Cladotrix* by Billet, that the brown colour of that organism is due to iron. Again, what does the author mean when, speaking of cilia, he says, they "appear to develop only in those organisms that have special affinity for oxygen, for, as soon as the ciliated forms reach the surface of a fluid, they lose their cilia or they become much less active," &c.? Tables of classification are heaped in with scarcely any attempt to sift and reduce them to a form compatible with the scope of the book. Is this done because, as the author says (p. 47), "to the pathologist, however, these classifications are of comparatively little value"? We maintain that for a work of this kind the author has no right to take a one-sided view, and that to the science of

bacteriology the study of morphology is as important as any other side of the subject.

Turning to the description of actinomycosis and anthrax, we are surprised to find McFadyean taken as the guide in the former. Why is not the author his own guide? Or why does he not, at least, use the recent results of Boström? Then in "anthrax" it is stated "that at the point of inoculation in animals there is usually no evidence at all that it has been the point of entrance of the bacilli." This is scarcely compatible with a thorough knowledge of this familiar organism.

Again, in the opening chapter, a number of bacteriologists' names are mentioned. We think the author hardly does justice to those of our own country, for amongst the four names placed by the author in honourable association with the great name of Sir Joseph Lister, neither Lankester, nor Tyndall, nor Lawes and Gilbert, nor Wooldridge, nor Lingard, finds a place. And yet not only are these amongst our highest authorities, but the observations of Lankester and the experiments of Wooldridge constitute cardinal points in the history of bacteriology.

Lastly, the question of illustrations is a difficult one. There are very many photographic processes to choose from, and considering that there are only 20 illustrations, the author might have employed collotypes (compare Fränkel's atlas) or copper blocks; or, having used zinc blocks, should have had them printed on separate sheets, for it ought to be more generally known that it is of no use expecting a good impression from blocks of this description when printed on ordinary paper and in the text.

OUR BOOK SHELF.

Our Country's Flowers. By W. J. Gordon. (London: Day and Son, 1891.)

THIS volume is intended to aid beginners to ascertain the botanical name of any British wild flower or fern with which they may meet. After a list of local English plant-names, the serious work of the book begins with an explanation of how plants are classified, interwoven with which are a sufficient number of the terms used in describing plants to make the book "not too technical, but just technical enough" for the reader who desires to have a "nodding acquaintance" with the wild flowers of his own country. This is given first in a chatty style, and then repeated in a convenient tabular form. Next, the essential characters of the natural orders are given, after which the buttercup order, or Ranunculaceæ, is treated of at some length as a pattern of how identifications can be made. This is followed by a glossary of botanical terms, in some of which, in attempting a condensed and popular style, the writer has somewhat distorted the meaning. "Cambium" is erroneously described as a layer of mucilage, instead of a tissue. The characters of the natural orders are again stated, this time in alphabetical sequence, followed by a chapter on the genera, each of which is accompanied by a woodcut, intended to show its diagnostic character, but it is doubtful whether (at least in some of the orders) this is accomplished, as is also the case with some of the specific diagnoses with which the volume closes.

In the 33 coloured plates 509 species are depicted. This crowding is unsatisfactory, and tends to obscure what might otherwise be very useful. The figure on plate 23, numbered 388, may possibly be intended for 368, the stinging-nettle, or it may be some abnormal

state of the inflorescence of a grape-vine. *Centranthus ruber* (204) and *Plantago lanceolata* (346) are also wonderful specimens of those plants. The artist, apparently, is amongst those who do not regard colour (unless it be the quantity thereof) as of value in discriminating species. The volume will, nevertheless, be a pleasant and useful companion to many during a country holiday, and, with the author, we hope will lead on to deeper study.

C. H. W.

A Summary of the Darwinian Theory of the Origin of Species. By Francis P. Pascoe, F.L.S., &c. (London: Taylor and Francis, 1891.)

IT is difficult to understand why the author of this pamphlet should think it worth while to remind his readers periodically that he is an opponent of Darwinism. Some space was recently devoted in these columns to the consideration of a book on the same subject by Mr. Pascoe, and the present production is nothing more than an abstract of this work, delivered in the form of an address to the Western Microscopical Club. We have no new facts nor arguments; there is the same lamentable display of misconception, and the author has simply strung together some sixteen pages of excerpts from the writings of Darwin and others, without any attempt at connected reasoning either for or against the Darwinian theory. The author's position is practically this: here is the whole animal kingdom, consisting of about 600,000 species; you must explain every detail of specific structure, down to the most insignificant, by the theory of natural selection; if you cannot do this, the theory is untenable. The whole of Mr. Pascoe's writings in connection with Darwinism amount to this, and nothing more; he has reiterated this statement, if not literally, at any rate in spirit, on every available opportunity for the last twenty years. The present pamphlet will, let us hope, for the sake of the author's reputation, be the last declaration to the same effect, for there is surely nothing gained either by Darwinism or anti-Darwinism by squandering the systematic powers which he is known to possess in picking out scraps of sentences from the "Origin of Species," &c., and publishing these things "of shreds and patches" under grandiloquent and misleading titles.

R. M.

The Business of Travel: a Fifty Years' Record of Progress. By W. Fraser Rae. (London: Thomas Cook and Son, 1891.)

THIS year the well-known firm of Thomas Cook and Son celebrate their fiftieth anniversary, and Mr. Fraser Rae has taken the trouble to write the present work in order to mark the occasion. The firm, it seems, had very small beginnings. Its history may be said to date from the day when, in 1841, Mr. Thomas Cook, walking along a country road, suddenly reflected that a certain temperance meeting at Loughborough would probably be a brilliant success if a special excursion train could be run between that place and Leicester. Apparently, no such thing as a special excursion train had ever before been heard of. The idea was carried out, and attracted so much attention that Mr. Cook—who was at that time a wood-turner—was often asked afterwards for advice in the organizing of railway excursions; and by and by he devoted himself wholly to the task of developing "the business of travel." His son has been for many years the sole managing partner, but to the elder Mr. Cook belongs the credit of having conceived the system with which his name is now associated. To what vast proportions the system has grown everyone knows; but there are probably few who know much about the various stages through which it has advanced to its present position. Mr. Fraser Rae tells the story clearly and effectively, and most readers, when they have finished his narrative, will be disposed to agree with him in thinking